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ABSTRACT

This report provides preliminary technical information on a method for analyzing the factors involved in the closing of elementary schools. Included is a presentation of data and a brief discussion bearing on descriptive statistics, reliability, and validity. An intercorrelation matrix is also examined. The method employs 9 factors that have a range of sufficient size to allow for adequate discrimination among the 12 schools included in the study. A composite score was derived for each school as an arithmetic average, though the results suggested that using profiles may be a preferred method of comparison. Reliability is discussed in terms of dependability of measurement, explicitness of procedure and directions, and the standard error of the mean. Evidence is also presented regarding content and construct validity. The correlation matrix is explored in terms of further study and statistical analysis. It is concluded that further research concerning these relationships would assist in developing a clearer conceptual framework for the closing of schools. (Author/PGD)

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Technical Notes on the Multifactor Method of Elementary School Closing

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1985

Abstract

This report provides preliminary technical information on a method of elementary school closing. Included is a presentation of data and brief discussion bearing on descriptive statistics, and reliability and validity. An intercorrelation matrix is also examined.

As described in earlier publications, the method employs nine factors. The nine factors tend to have a range of sufficient size to allow for adequate discrimination among the twelve schools included in the study. A composite score was derived for each school as an arithmetic average. However, a preferred method of comparison may be to use profiles. Reliability is discussed in terms of dependability of measurement, explicitness of procedure and directions, and the standard error of the mean. Evidence is also presented regarding content and construct validity. The correlation matrix is explored in terms of further study and statistical analysis. It is concluded that further research of these relationships would assist in developing a clearer conceptual framework for the closing of schools.

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Technical Notes on the Multifactor Method of Elementary School Closing

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This paper provides preliminary technical information on a method of elementary school closing (Puleo, 1982a, 1982b, 1982c, 1985).

Included in the following is a presentation of data and brief discussion bearing on descriptive statistics, and reliability and validity. An intercorrelation matrix is also examined.

Descriptive Statistics

Tables 1 and 2 show this information. All factors with the exception of the program facilities rating are attributes. Also, all factors are unweighted.

The nine factors shown in Table 1 tend to have a range of sufficient size to allow for adequate discrimination among the twelve schools. Lacking a regression analysis of the relative contribution of each factor to a criterion, it would appear that this set carries a meaningful basis of comparison. However, it is accepted that other local circumstances would require a different composition of the set.

Original data was transformed into standard scores as well as ranks. A composite score was derived for each school as an arithmetic average. Information bearing on composite scores is shown in Table 2. The relatively small range and standard deviation indicate that averaging the factors tended to reduce variability. This suggests that, in contrast to using a composite score, a preferred method of comparison may be to use profiles. Profiles would enhance the identification of the strengths and weaknesses of each school. Future study should also

explore the role of weighting each factor as a means of increasing discriminability. Of interest would be to evaluate weighting using both the composite score and profile as means of comparison and analysis.

Reliability

The most meaningful estimate of reliability for a heterogenous score as employed herein is stability of measurement. The pressing question regarding dependability of the composite score would seem to be: If this method were applied a second time, would the same conclusion result?"

At the present time the method has not been subjected to this type of analysis. Review and consideration of the nature of the factors involved nevertheless would seem to suggest that for a considerable time period, that is, within the same school year, results from the majority of factors would remain identical while a couple may vary slightly. For instance, building age obviously will not change in the course of the year, and then when it does, relative ranking remains identical. Enrollment may vary slightly, and this may effect ranking, but standard scores will not be effected to any extent. The program facilities rating (Puleo, 1985) appears to provide highly reliable results when applied appropriately. In conclusion, reason would dictate that the composite score will remain highly stable within the course of the same school year.

In general terms, reliability is known to be fostered by clarity in procedure and explicitness of directions. Every effort was made to follow these basic tenets of measurement.

Empirically, Table 2 indicates that the standard error of the mean standard score was 1.23. Within a range of 44.3 to 57.0, this suggests

that two-thirds of hypothetically repeated assessments would be in the relatively narrow band of approximately 2.5 points.

Validity

No evidence is available at the moment regarding concurrent or predictive validity. The latter form of validation is of low priority. It would be of interest however to correlate results from an application of the method against some current external and independent standard.

Two types of validity do appear supported. If the series of nine factors used in the present application adequately represent the domain of factors one would consider in a possible school closing, it would appear that the method possesses strong content validity. With other possible applications, to the extent that a reason for closing is clearly established, and relevant factors are chosen, content validity should similarly be evident. In other words, appropriate application of the method provides built-in content validity.

Elements of construct validity are promising. The nine factors yield an operational definition of "the most appropriate school to close". This anchorage to observable events makes the results of the question of whether the most appropriate school was indeed identified amenable to empirical investigation. If relationships were established, eg, regarding staff acceptance or community reaction, the construct acquires corroborating evidence. While no formal study of this type has been undertaken, informal observations at the time of the project in 1982 did reveal a series of positive reactions to this general line of thinking.

Intercorrelation Matrix

Table 3 portrays this data. The matrix is pregnant in terms of further study and statistical analysis. It shows, for instance, that building age is inversely related to all factors with the exception of the facilities rating. A lower rating on The Building Program Facilities Rating Scale means a poorer physical environment for the conduct of educational programs. Interesting also, for the schools in the present study, older schools cost less to operate in an absolute sense, yet because they enrolled relatively fewer students they were less efficient to operate. Added transportation costs were moderately inversely related to building age because most of these schools were in an urban area, and hence there were more walkers.

Also, the highest correlation to the composite score was efficiency of building operation. It was indicated above that the more financially efficient schools were the older ones. This shows a trade-off in the thinking underlying the set of factors involved. It also carries implications regarding relative emphasis or weighting. If, for example, older schools are targeted for closing from the very beginning, their weighting in the pool of schools should be reflected accordingly. The second highest correlation with the composite was the number of students moved. This was also monitored very closely as it was regarded as a direct index of the "pain" required to accomplish the goal of the project. Further exploration of these relationships would assist in developing a clearer conceptual framework for the closing of schools.

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Table 1
Descriptive Statistics For Nine Factors
Applied To Twelve Elementary Schools

	Range	Mean	SD
Enrollment	228-432	324	64
Building Age in Years	13-108	35.58	29.54
Percent of Enrollment Decline	4.3-23.3	13.73	6.52
Cost of Building Operation	\$57,172.-\$117,620.	\$87,808.	\$16,514.
Efficiency of Building Operation (Cost of Bldg. Oper./Bldg. Enroll.)	\$203.-\$396.	\$277.	\$61.
Number of Students Moved	235-515	337	83
Salaries Saved	\$57,000.-\$209,000.	\$142,417.	\$42,435.
Program Facilities Rating	22.3-45.6	33.64	7.46
Additional Transportation Cost	\$2,000-15,000.	\$6192.	\$4706.

Table 2
Descriptive Statistics And Standard Error
Of The Mean For Composite Score
(In Scaled Score Units)

Number of Schools	12
Range	44.3 - 57.0
Mean	50.00
SD	4.28
SE Mean	1.23

Table 3
Intercorrelations (Based On Standard Scores)

	Bldg. Age	% Enroll. Decl.	Cost Bldg. Oper.	Effic. Bldg. Oper.	No. Stu. Moved	Sal. Saved	Facil. Rating	Added Transp.	Compos. Score
Enrollment	.058	.010	-.429	.550	.764	.169	.323	-.140	.595
Building Age		-.306	-.391	-.299	-.270	-.455	.725	-.752	-.178
% Enroll. Decl.			.263	.213	.503	.287	-.208	.366	.550
Cost Bldg. Oper.				.499	-.026	.172	-.633	.814	.328
Effic. Bldg. Oper					.676	.336	-.253	.627	.864
No. Stu. Moved						.327	-.170	.318	.806
Salaries Saved							-.318	.446	.508
Facil. Rating								-.799	-.087
Added Transp.									.486